

**UNITED STATES DISTRICT COURT  
EASTERN DISTRICT OF VIRGINIA  
Alexandria Division**

**BMG RIGHTS MANAGEMENT  
(US) LLC, and ROUND HILL  
MUSIC LP**

Plaintiffs,

v.

**COX COMMUNICATIONS, INC.,  
COXCOM, LLC**

Defendants.

Case No. 1:14-cv-1611(LOG/JFA)

**DECLARATION OF BARBARA FREDERIKSEN-CROSS**

I, Barbara Frederiksen-Cross, hereby declare as follows:

1. My name is Barbara Frederiksen-Cross and I am the Senior Managing Consultant of Johnson-Laird, Inc. (JLI). On June 19<sup>th</sup>, 2015, I submitted an expert report in this case relating to the technology Rightscorp uses to identify copyright infringement by Cox subscribers on the Cox network. I submitted a reply expert report on July 24, 2014 in this case and a corrected reply expert report on July 27, 2015. I also previously submitted a declaration on July 15, 2015 relating to my comparison of source code files from 2013 and 2015 snapshots of Rightscorp's source code.
2. In 2013, I was provided with code relating to the core modules of Rightscorp's system for detecting infringements by Peers on a BitTorrent network and collecting the evidence of these infringements, including downloading samples of the works offered by the Peers. These core modules were Infringement Finder and SampleIt2.

3. At the request of counsel, I have been asked to prepare this declaration, which provides a more detailed description of the code changes I found in the 2013 and 2015 snapshots of the Rightscorp files I compared, which were discussed in my reply expert report.

4. My comparison focused on source code related to core functionality used by Rightscorp's Infringement Finder and SampleIt2 processes.

5. The Infringement Finder processing is used by Rightscorp to identify BitTorrent Peers that are offering to share copies of Plaintiffs' monitored works. This processing is the "Core Functionality" of Infringement Finder and is performed by Test5.java and related components. For the Infringement Finder processing, I compared the 2013 and 2015 snapshots of the following files:<sup>1</sup>

- **Test5.java** – the main logic for collecting evidence that BitTorrent Peers are offering to share monitored works
- **InfringementKeys.java** – contains portions of the code used when a peer's ISP is identified so that it can be included in the infringement record data passed by Test5.java to Detected.jsp.
- **IPProcessor2.java** – Used to prepare the ARIN "whois" lookup that will identify the ISP that owns a particular IP address
- **TorrentRequest.jsp** – Used to select a random torrent for processing by Test5.java
- **TorrentProcessor.java** – Part of the BitTorrent API – provides class functions for processing a torrent file
- **DownloadManager.java** – Part of the BitTorrent API – provides functions for downloading pieces of the torrent payload from a peer
- **PeerUpdater.java** – provides methods to enable communication between the BitTorrent client and a tracker, including the methods that process the map representing the tracker response
- **Peer.java** – provides methods for the BitTorrent Peer
- **Detected.jsp** – updates the TorrentInfractions database with data passed to it from Test5.java

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<sup>1</sup> I do not include comparisons between 2015 source code and 2013 manual processes because there is no specific source code to compare in the case of manual processes.

6. The SampleIt2 processing is used by Rightscorp to download samples of monitored works from peers that Infringement Finder found to be offering to share copies of Plaintiffs' monitored works. This is the "Core Functionality" of SampleIt2. For the SampleIt2 processing, I compared the 2013 and 2015 snapshots of the following files:

- **SampleIt2.java** - the main logic for downloading samples of monitored works from BitTorrent Peers that were identified by Infringement Finder processing
- **DownloadRequest.jsp** – Selects the infringement record that identifies a BitTorrent Peer that will be contacted in order to download a sample of the monitored works
- **TorrentProcessor.java** - Part of BitTorrent API – provides class functions for processing a torrent file (this same file is used in Infringement Finder processing)
- **TorrentFile.java** – Provides class TorrentFile with methods relating to processing a torrent file
- **TFT.jsp** – Called by SampleIt2 to update the TorrentSamples and TorrentSamplesIndex databases with the downloaded sample and related information

7. As noted in my previous declaration, it is my opinion that there are no significant functional differences that affect the quality of the sampling and infringement detection in the core processes (*i.e.*, Infringement Finder and SampleIt2) of the 2013 files when compared to the corresponding 2015 files. To the extent there are differences, those differences, or changes were made to make the code run more efficiently (*i.e.*, using less memory and hardware), to handle errors more efficiently, to increase sampling, to increase the sensitivity of the infringement detection, to generally make the code more concise, and in some instances to automate some tasks that were done manually.

8. With respect to changes directed to increasing the sensitivity of the infringement detection and thereby also increasing the scope of some sampling, these changes were affected by code that was added outside the core programs described below. The code affecting these changes lowered the threshold for peers that were eligible to receive infringement notices from

those offering 100% of payload pieces to those offering 10% of payload pieces.<sup>2</sup> Mr. Boswell has testified that this code was added in December 2014 and I have seen no evidence that contradicts this testimony.

9. With respect to the 2015 code used to automate manual processes, this code was primarily directed to ingestion of \*.torrent files, selecting from the downloaded \*.torrent files those specific \*.torrent files that relate to monitored works, and then verifying the identity of ingested works by using Acoust ID and/or Audible Magic to identify contents. I do not include code comparisons between the manual and automated processes because there was not any 2013 source code relating to these manual processes.

10. In the following sections of this declaration, I provide a table for each set of files I did compare. In these tables I summarize the specific changes I found when comparing the 2013 and 2015 snapshots of the source code files. The left column contains a description of the change, and the right column contains my analysis with respect to its importance.

#### **I. Infringement Finder Processing**

11. As noted above, Infringement Finder processing is performed by Test5.java and related components. This processing is directed to detecting BitTorrent peers that are offering to share copies of monitored works. The tables below summarize the changes for the Infringement Finder processing components.

Test5.java<sup>3</sup>

| Change in 2015 source code                     | Impact of Change   |
|--|--|
| Remove comments that were present in 2013 code | No impact on processing. Comments are optional notes embedded in the source code as an aid to the programmer. Comments do not affect operation of the code or change |

<sup>2</sup> These files are FullFilesBeing.txt and FullFileFix.txt.

<sup>3</sup> 2013/JDRC9003\_code from DRC/jBittorrentAPI-1/com/boswell/torrent/Test5.java compared to JDRC9021\_Rightscorp code as produced to Cox/Rightscorp Source Code/Rightscorp Source Code/com/boswell/torrent/Test5.java

|   |   |
|---|---|
|   | processing logic.   |
| IP address of server was changed  | No impact. This statement provides the address of the Rightscorp server(s) used for parts of the processing but does not change processing logic.   |
| Remove @Override annotations that were present in 2013 code                           | @Override annotations are metadata used by the java language compiler; their presence or absence does not change processing logic of the program.   |
| Addition of a new class "LocalIP" in the 2015 code                                    | This is an improvement to performance. The 2015 code will check a local cache for the identity of the ISP, in case the ISP is already known to the Rightscorp system. If the ISP is not found in the local cache, the 2015 code performs the same type of ARIN lookup that was used in the 2013 code to identify the ISP that own the IP address a peer is using. |
| Remove or modify lines printed to standard output and standard error in the 2013 code | These changes were to print lines that can be used to help a programmer trace or observe what the program is doing. They do not change processing logic.  |

#### InfringementKeys.java<sup>4</sup>

| Change in 2015 source code                         | Impact of Change   |
|--|--|
| Remove comments that were present in the 2013 code | No impact on processing. Comments are optional notes embedded in the source code as an aid to the programmer. Comments do not affect operation of the code or change processing logic. |

#### IPProcessor2.java<sup>5</sup>

| Change in 2015 source code                         | Impact of Change   |
|--|--|
| Remove comments that were present in the 2013 code | No impact on processing. Comments are optional notes embedded in the source code as an aid to the programmer. Comments do not affect operation of the code or change processing logic. |

#### TorrentRequest.jsp<sup>6</sup>

| Change in 2015 source code | Impact of Change                                     |
|----------------------------|--|
| Remove comments that were  | No impact on processing. Comments are optional notes |

<sup>4</sup> 2013/JDRC9003\_code from DRC/jBittorrentAPI-1/com/boswell/torrent/InfringementKeys.java compared to 2015/JDRC9021\_Rightscorp code as produced to Cox/Rightscorp Source Code/Rightscorp Source Code/com/boswell/torrent/InfringementKeys.java

<sup>5</sup> 2013/JDRC9003\_code from DRC/jBittorrentAPI-1/com/boswell/torrent/IPProcessor2.java compared to 2015/JDRC9021\_Rightscorp code as produced to Cox/Rightscorp Source Code/Rightscorp Source Code/com/boswell/torrent/IPProcessor2.java

<sup>6</sup> 2013/JDRC9002\_missing DRC code/jli transmittal 7-2-13/TorrentRequest.jsp compared to 2015/JDRC9021\_Rightscorp code as produced to Cox/Rightscorp201506091/20150609/TorrentRequest.jsp

|  |   |
|--|---|
| present in the 2013 code                                 | embedded in the source code as an aid to the programmer. Comments do not affect operation of the code or change processing logic.   |
| Remove unused imports that were present in the 2013 code | No impact on processing. These references were unused code that did not affect processing logic.  |
| Remove unused code                                       | No impact on processing. The code was never referenced and did not affect processing logic.   |
| Add error trap   | No significant change to processing. Change identifies an additional error condition.   |
| Add lines printed to standard output                     | No significant change to processing. Change provides trace information for the programmer in the event an error is encountered.   |
| Changes to an SQL query                                  | <p>In the 2015 code, the query used to select data from the torrents table was modified. The modification added an additional selection criterion: the selection of a random hash from the torrentcopyrights table (this table keeps track of torrents verified to contain monitored works.)</p> <p>This change is an accommodation to the automation of torrent ingestion processing. In the 2013 code this step was not needed, since the manual processing downloaded only torrents that had monitored works. In contrast, the automated torrent ingestion used in 2015 downloads a wider collection of torrents, then performs additional processing to identify and process only those torrents that contain monitored works.</p> <p>This change did not alter core processing logic, which in both the 2013 and 2015 snapshots processes torrents that contain monitored works.</p> |

TorrentProcessor.java<sup>7</sup>

| Change in 2015 source code  | Impact of Change |
|-----------------------------|------------------|
| No differences <sup>8</sup> |                  |

<sup>7</sup> D:\DRC (Rightscorp v cox) workarea\Rightscorp\_source\_code\2013 transmittals\ (2013-11-13)JDRC9003 RC20130909(code sent via email 2013-11-13)\jBittorrentAPI-1\jBittorrentAPI\TorrentProcessor.java compared to D:\DRC (Rightscorp v cox) workarea\Rightscorp\_source\_code\2015 transmittals\JDRC9021\_Rightscorp code as produced to Cox\Rightscorp Source Code\Rightscorp Source Code\jBittorrentAPI\TorrentProcessor.java

<sup>8</sup> One copy of the 2013 code was the same as one copy of the 2015 code. There were only trivial differences in the other copies of this file for 2013 and 2015 code snapshots.

DownloadManager.java<sup>9</sup>

| Change in 2015 source code   | Impact of Change   |
|--|--|
| Objects with “Protected” access in 2013 changed to “Public” access in 2015 code. | This change affects which classes or subclasses are able to use certain member objects. The change allows higher level code to interact with these objects, but does not alter the primary processing logic. |

PeerUpdater.java<sup>10</sup>

| Change in 2015 source code                               | Impact of Change   |
|--|--|
| An Import statement was added to 2015 code               | Import for ‘com.sun.org.apache.bcel.internal.generic.GotoInstruction.’ Java language support for the “GOTO” programming instruction.   |
| Add/remove lines printed to standard output in 2015 code | These changes were to print lines that can be used to help a programmer trace or observe what the program is doing. They do not change processing logic.   |
| Changes to tracker update interval                       | Updates the tracker update interval value to always be twice the original value. Does not change processing, only the interval used for the tracker update.  |
| Code changes to “itr” variable                           | Sets the iterator (“itr”) value based on tracker response instead of realports. Changes structure of object used for peer discovery to get more peers, but no significant impact on how peers are processed.   |
| Additional error trapping added in 2015                  | No significant change to processing. Enhancement provides better trace information for the programmer in the event an error is encountered.  |
| Changes to BitTorrent API code used to contact tracker   | The tracker provides information about which peers are available in the swarm, and this code change does not alter this role. The code change better accommodates support for torrents with multiple trackers (a feature that was added to the BitTorrent protocol in 2009). |

<sup>9</sup> 2013/JDRC9003\_code from DRC/jBittorrentAPI-1/jBittorrentAPI/DownloadManager.java compared to 2015/JDRC9021\_Rightscorp code as produced to Cox/Rightscorp Source Code/Rightscorp Source Code/jBittorrentAPI/DownloadManager.java

<sup>10</sup> 2013/JDRC9003\_code from DRC/jBittorrentAPI-1/jBittorrentAPI/PeerUpdater.java compared to 2015/JDRC9021\_Rightscorp code as produced to Cox/Rightscorp Source Code/Rightscorp Source Code/jBittorrentAPI/PeerUpdater.java

Peer.java<sup>11</sup>

| Change in 2015 source code   | Impact of Change |
|------------------------------|------------------|
| No differences <sup>12</sup> |                  |

Detected.jsp<sup>13</sup>

| Change in 2015 source code   | Impact of Change   |
|--|--|
| Remove comments  | No impact on processing. Comments are optional notes embedded in the source code as an aid to the programmer. Comments do not affect operation of the code or change processing logic. |
| Remove unused imports and variables  | No impact on processing. These references were unused code that did not affect processing logic.   |
| Remove unused code   | No impact on processing. The code was never referenced code and did not affect processing logic.   |
| Remove lines printed to standard output  | These changes were to print lines that can be used to help a programmer trace or observe what the program is doing. They do not change processing logic.                               |
| Change lines that were printed to standard error to instead print to standard output | These changes were to print lines that can be used to help a programmer trace or observe what the program is doing. They do not change processing logic.                               |
| Add additional cleanup code in the case where errors are detected                    | Improvement to error handling. Does not affect normal processing logic.  |
| Modify SQL for botreport to add delay  | This change improves resource use for a database table used as a logging/debug resource. Does not change primary processing logic.   |

## II. SampleIt2 processing

12. This processing is performed by SampleIt2.java and related components. This processing is directed to downloading samples of the monitored works from peers identified by the

<sup>11</sup> D:\DRC (Rightscorp v cox) workarea\Rightscorp\_source\_code\2013 transmittals\2013-11-13\JDRC9003\_RC20130909(code sent via email 2013-11-13)\jBittorrentAPI-1\jBittorrentAPI\Peer.java compared to D:\DRC (Rightscorp v cox) workarea\Rightscorp\_source\_code\2015 transmittals\JDRC9021\_Rightscorp code as produced to Cox\Rightscorp Source Code\Rightscorp Source Code\jBittorrentAPI\Peer.java

<sup>12</sup> One copy of the 2013 code was the same as one copy of the 2015 code. There were only trivial differences in the other copies of this file for 2013 and 2015 code snapshots.

<sup>13</sup> /2013/JDRC9002\_missing DRC code/jli transmittal 7-2-13/Detected.jsp compared to 2015/JDRC9021\_Rightscorp code as produced to Cox/RightscorpRequest201505281/Detected.jsp



Infringement Finder processing. The tables below summarize the changes for the SampleIt2 processing components.

SampleIt2.java<sup>14</sup>

| Change in 2015 source code  | Impact of Change   |
|---|--|
| Remove comments that were present in 2013 code  | No impact on processing. Comments are optional notes embedded in the source code as an aid to the programmer. Comments do not affect operation of the code or change processing logic.   |
| Remove lines printed to standard output that were present in 2013 code  | These changes were to print lines that can be used to help a programmer trace or observe what the program is doing. They do not change processing logic.   |
| Add/modify lines printed to standard output in 2015 code  | This change was to a print line that can be used to help a programmer trace or observe what the program is doing. It does not change processing logic.   |
| IP address of server was changed, and was move from hardcoded in code to hardcoded in a variable used by code. Also added ability to pass in the server address as a command argument.  | No impact. This change provides the address of the Rightscorp server(s) used for parts of the processing but does not change processing logic.   |
| Rearrange and reorder code: <ul style="list-style-type: none"> <li>Rearrange code to change where data from input stream is encapsulated (i.e. to identify start of the data from the input stream to be processed)</li> <li>Relocate code that retrieves the torrent file</li> </ul> | These changes relocate code to provide more clarity in the code, more streamlined processing, and better error handling. Also allows code to adjust for small differences in the *.torrent file layout. These changes do not alter the essential processing functions of the code. |
| Changes to data types (i.e. the designation that controls the way data is represented internally in the computer, the value types it can accept, and the operators it supports)   | The data type used for internal data representation is changed. These changes do not alter the essential processing function of the code.  |
| Relocation of code to verify hash of each piece as the piece is downloaded in 2015 code   | This change does not alter the primary processing function of the code, which still attempts to download, verify, and store all pieces of the monitored work.  |

<sup>14</sup> 2013/JDRC9003\_code from DRC/jBittorrentAPI-1/com/boswell/torrent/SampleIt2.java compared to 2015/JDRC9021\_Rightscorp code as produced to Cox/Rightscorp Source Code/Rightscorp Source Code/com/boswell/torrent/SampleIt2.java

|   |  |
|---|--|
| Add code to check for missing pieces halfway through piece collection loop. | This change improves efficiency of the piece collection routine by detecting missing pieces earlier in processing and restarting a process to collect the missing pieces. This change does not alter the primary processing function of the code, which still attempts to download and store all pieces of the monitored work. |
| Add cleanup code  | Improves efficiency but does not change function.  |

DownloadRequest.jsp<sup>15</sup>

| Change in 2015 source code  | Impact of Change   |
|---|--|
| Cleanup of import statements that were present in 2013 code   | This change removed unused import statements from the 2015 code and added the import for “java.sql.PreparedStatement” (an object used to represent precompiled SQL statements). This change was directed to removing unused code and making the code more concise and legible. This change did not alter the function of the code.   |
| Remove or modify lines printed to standard output and standard error that were present in 2013 code | These changes were to print lines that can be used to help a programmer trace or observe what the program is doing. They do not change processing logic.   |
| Remove unused code from 2013 code   | No impact on processing. The code was never referenced and did not affect processing logic.  |
| Replace the SQL statement used to select which infringement records will be processed               | <p>In the 2013 code, “qry5” selects fields from table “ExpandedTI” based on the join of a hash value from the “torrents” table. In the 2013 snapshot of the code provided to JLI some specific ISP’s are excluded from processing by the select statement.</p> <p>In the 2015 code the query “q7” selects fields from table “GetThisInfringer” based on a join of a hash value from the “torrents” table.</p> <p>This change reflects the use in the 2015 code of the GetThisInfringer table, whose contents are derived from the ExpandedTI table after applying filters for dates and missing ISP contact info. The GetThisInfringer table was not used in the 2013 code, which accepted input directly from the ExpandedTI table.</p> |
| Remove rows from GetThisInfringer table when IP   | This change increases processing efficiency by preventing repeat sampling for the same IP/filename combination. This   |

<sup>15</sup> 2013/JDRC9002\_missing DRC code/jli transmittal 7-2-13/DownloadRequest.jsp compared to 2015/JDRC9021\_Rightscorp code as produced to Cox/RightscorpRequest201505281/DownloadRequest.jsp

|                                   |   |
|-----------------------------------|---|
| and filename match previous query | change does not alter the primary SampleIt2 processing logic. |
|-----------------------------------|---|

TorrentProcessor.java<sup>16</sup>

| Change in 2015 source code   | Impact of Change |
|------------------------------|------------------|
| No differences <sup>17</sup> |                  |

TorrentFile.java<sup>18</sup>

| Change in 2015 source code   | Impact of Change |
|------------------------------|------------------|
| No differences <sup>19</sup> |                  |

TFT.jsp<sup>20</sup>

| Change in 2015 source code                              | Impact of Change   |
|---|--|
| Removed unused imports from 2013 code                   | No impact on processing. These references were unused code that did not affect processing logic.   |
| Remove comments from 2013 code                          | No impact on processing. Comments are optional notes embedded in the source code as an aid to the programmer. Comments do not affect operation of the code or change processing logic. |
| Modify, add or removed lines printed to standard output | These changes were to print lines that can be used to help a programmer trace or observe what the program is doing. They do not change processing logic.                               |
| Modify or removed lines printed to standard error       | These changes were to print lines that can be used to help a programmer trace or observe what the program is doing. They do not change processing logic.                               |
| Resource cleanup code was added                         | These changes were to close database connections and flush buffers. They make processing more efficient but do not change processing logic.  |

<sup>16</sup> D:\DRC (Rightscorp v cox) workarea\Rightscorp\_source\_code\2013 transmittals\2013-11-13\JDRC9003 RC20130909(code sent via email 2013-11-13)\jBittorrentAPI-1\jBittorrentAPI\TorrentProcessor.java compared to D:\DRC (Rightscorp v cox) workarea\Rightscorp\_source\_code\2015 transmittals\JDRC9021\_Rightscorp code as produced to Cox\Rightscorp Source Code\Rightscorp Source Code\jBittorrentAPI\TorrentProcessor.java

<sup>17</sup> One copy of the 2013 code was the same as one copy of the 2015 code. There were only trivial differences in the other copies of this file for 2013 and 2015 code snapshots.

<sup>18</sup> D:\DRC (Rightscorp v cox) workarea\Rightscorp\_source\_code\2013 transmittals\2013-11-13\JDRC9003 RC20130909(code sent via email 2013-11-13)\jBittorrentAPI-1\jBittorrentAPI\TorrentFile.java compared to D:\DRC (Rightscorp v cox) workarea\Rightscorp\_source\_code\2015 transmittals\JDRC9021\_Rightscorp code as produced to Cox\Rightscorp Source Code\Rightscorp Source Code\jBittorrentAPI\TorrentFile.java

<sup>19</sup> One copy of the 2013 code was the same as one copy of the 2015 code. There were only trivial differences in the other copies of this file for 2013 and 2015 code.

<sup>20</sup> 2013/JDRC9002\_missing DRC code/jli transmittal 7-2-13/TFT.jsp compared to 2015/JDRC9021\_Rightscorp code as produced to Cox/Rightscorp201506091/20150609/TFT.jsp

|   |  |
|---|--|
| Code reordered, some variable named changed and added                       | Some code was moved from one location to another. Restructuring this code did not change processing logic.   |
| Addition of code to remove row from database table 'GetThisInfringer'       | Code was added to remove a row from the 'GetThisInfringer' after performing all other processing for the sample. This change increased code efficiency by reducing the likelihood of redundant processing, but did not alter the primary processing logic. |
| Addition of code to limit very large samples from being stored in database. | Samples that were larger than 3 Billion bytes, were truncated at 3 billion bytes.  |
| Added reference to GrandeSamples in an SQL query                            | This change is an artifact from processing for ISP Grande Communications and not relevant for COX processing.  |

13. I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct to the best of my knowledge.

Executed on September 28, 2015.



Barbara Frederiksen-Cross

**CERTIFICATE OF SERVICE**

I hereby certify that on September 29, 2015, I electronically filed a true and correct copy of the foregoing using the Court's CM/ECF system, which then sent a notification of such filing (NEF) to all counsel of record:

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